

Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1. (currently amended) A method for configuring and rebuilding a redundant array of independent disks after more than one concurrent disk failure, comprising

configuring the array with D disk drives of B physical blocks each;

allocating N user data and redundant data blocks to each disk drive; and

allocating F free blocks as hot spare space to each disk drive, where $N + F \leq B$, and $((D - M) \times F) \geq N$ to enable rebuilding of data and redundant blocks of a failed disk drive in the free blocks of the remaining disk drives after M concurrent disk drive failures.

2. (original) The method of claim 1 further comprising:

detecting M disk drive failures;

generating new user data and redundant data to recover from the M disk failures;

moving the new data and redundant data into the hot spare space; and

rearranging all of the data and redundant blocks of the D-M disk drives to rebuild the array with fewer disks and an identical level of redundancy.

3. (currently amended) A method of claim 1 further comprising:

generating new user data and redundant data to recover from a single failed disk;

moving the new data and redundant data into a part of the hot spare space;
and

rearranging all of the data and redundant blocks of the remaining disk drives to rebuild the array with fewer disks and an identical level of redundancy so that remaining hot spare space which can accommodate M-1 additional disk drive failures.

4. *(original)* A method of claim 1 further comprising:

generating new data and redundant data for concurrent disk drive failures of more than one disk drive;

moving the new data and redundant data into a part of the hot spare space;
and

rearranging all of the data and redundant blocks of the remaining disk drives to rebuild the array with fewer disks and an identical level of redundancy.

5. *(currently amended)* The method of claim 1 ~~further wherein~~ where M is equal to one, and further comprising:

generating new data and redundant data for a failure of exactly one disk drive;

moving the new data and redundant data into a part of the hot spare space;
and

rearranging all of the data and redundant blocks of the remaining disk drives to rebuild the array with fewer disks and an identical level of redundancy.

6. *(original)* The method of claim 1 wherein the redundant data are mirror blocks.
7. *(original)* The method of claim 1 wherein the redundant data are parity blocks.
8. *(original)* The method of claim 1 wherein all disk drives except failed disk drives are actively used while recovering from the M disk drive failures.
9. *(original)* The method of claim 2 wherein the generating uses an exclusive OR operation.
10. *(currently amended)* A redundant array of independent disks with hot spare space, comprising:
 - a RAID controller operating at a RAID level that can withstand more than one concurrent disk drive failure;
 - D disk drives of B physical blocks each;
 - N user data and redundant data blocks allocated to each of the D disk drives;
 - F free blocks allocated as hot spare space to each of the D disk ~~drive~~ drives, where $N + F \leq B$, and $((D - M) \times F) \geq N$; and
 - means for rebuilding the data and redundant blocks of a failed disk drive in the free blocks of the remaining disk drives after M concurrent disk drive failures.